

[0029] FIG. 12 shows an image display apparatus according to a sixth embodiment of the present invention;

[0030] FIG. 13 shows an image display apparatus according to a seventh embodiment of the present invention;

[0031] FIG. 14 is a sectional view of an image display apparatus according to an eighth embodiment of the present invention;

[0032] FIG. 15 is a sectional view of an image display apparatus according to a ninth embodiment when it is opened;

[0033] FIG. 16 is a sectional view of the image display apparatus according to the ninth embodiment when it is closed;

[0034] FIG. 17 shows the image display apparatus according to the ninth embodiment viewed from the back side when it is on the way from a closed state to an open state;

[0035] FIG. 18 shows a vicinity of a thinner portion indicating the function of a spring member when two frames are opened;

[0036] FIG. 19 shows a vicinity of the thinner portion indicating the function of the spring member when two frames are closed;

[0037] FIG. 20 is a perspective view of an image display apparatus according to a tenth embodiment when it is opened;

[0038] FIG. 21 is a perspective view of the image display apparatus according to the tenth embodiment when it is closed;

[0039] FIG. 22 is a sectional view of an image display apparatus according to an eleventh embodiment when it is opened; and

[0040] FIG. 23 is a sectional view of the image display apparatus according to the eleventh embodiment when it is closed.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0041] Embodiments of the present invention will be described below with reference to the drawings.

[0042] FIG. 1 is an external view of an image display apparatus according to a first embodiment of the present invention, FIG. 2 is a sectional view of the image display apparatus shown in FIG. 1 when it is opened, and FIG. 3 is a sectional view of the image display apparatus shown in FIG. 1 when it is closed.

[0043] An image display apparatus 10 can be used as a mobile phone. As shown in FIG. 1, the image display apparatus 10 is provided with a cover 12 having two frames 121 and 122 linked through a pivot 11 each of which is closable and openable. The cover 12 is made of hard material such as hard plastics to protect the image display apparatus. A display screen 14 is arranged inside the two frames 121 and 122 when they are closed so as to become flat being supported at the ends thereof by the two frames when they are opened. As shown in FIG. 1, the display screen 14 composes a screen 141, push buttons 142 and a menu image 143 which are part of the displayed image, but

their appearances are similar to the counterparts of a conventional mobile phone. On the back of the push buttons 142 disposed is a touch sensor 15 (see FIG. 2), which detects the touch of the button by a user's touching the displayed push buttons 142 with his or her finger.

[0044] As shown in FIG. 2, inside the image display apparatus 10 incorporated are a circuit board 16, a small microphone 17, a small sounding body 18 and a battery 19 as well as the touch sensor 15. The circuit board 16 is equipped with various circuit components to perform the function of a telephone and to control display of an image on the display screen 14. The small microphone 17 and the sounding body 18 are for performing the function of a telephone and the battery 19 is for driving the circuit. The display screen 14 is flexible, for example, formed by an organic EL display member.

[0045] The image display apparatus 10 is openable and closable around the pivot 11 in the direction indicated by the arrow in FIG. 2. Therefore, the image display apparatus 10 becomes very compact when it is closed, while it has the display screen 14 spread widely on the almost whole area of the inside thereof when it is opened.

[0046] When the two frames 121 and 122 are closed, the display screen 14 is folded into two by having its part close to the pivot 11 curved as shown in FIG. 3. The conventional technique that plural display screens are folded like being stacked and unfolded like being aligned horizontally has a problem in that there are linear missing parts on the image displayed on the display screen. However, by employing an almost flush display screen when it is spread, the problem can be solved.

[0047] Various embodiments are illustrated from now on, but the common description with the first embodiment is omitted and only distinctive features of each embodiment will be described.

[0048] FIG. 4 is an external perspective view of an image display apparatus according to a second embodiment when it is opened and FIG. 5 is a sectional view of the image display apparatus shown in FIG. 4 when it is closed. In order to make it easy to understand, the same elements as those shown in FIGS. 1 to 3 are designated with the same reference characters as those in FIGS. 1 to 3 irrespective of minor difference in a form. The same is applied to the other embodiments.

[0049] As indicated in FIG. 4, an image display apparatus 20 according to a second embodiment has a battery unit 22. The battery unit 22 is pivotably supported by a pivot 21 relative to one frame 122 of the two frames that compose a cover 12. By employing the battery unit 22, it is possible to make the apparatus thinner and smaller by eliminating the battery 19 (see FIG. 2) incorporated in the apparatus according to the first embodiment. It is also possible to enhance battery capacity by adding the battery unit 22 to the battery unit 19.

[0050] The battery unit 22 in FIG. 4 can pivot between a housed position and a position in use. The housed position is where the battery unit 22 is placed on the display screen 14 after being pivoted in the direction of the arrow A shown in FIG. 4, while the position in use is where the battery unit is opened from the housed position. The battery unit 22 in the housed position is further housed by closing the frame